UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
FIVE POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

January 14, 2010

Michael Webster
GeoInsight
5 Lan Drive, Suite 200
Westford, MA 01886-3538

Re: Wells G&H Superfund Site – Olympia Nominee Trust Property – Administrative Order #01-2004-0059 - Request for Corrective Action

Dear Mr. Webster:

The Environmental Protection Agency (EPA) has reviewed your 59th, 60th, and 61st progress reports summarizing the results of sodium permanganate injection activities completed at the Former Drum Disposal Area (FDDA) within the 60 Olympia Avenue property in Woburn, Massachusetts. EPA has two main concerns:

1) The October 3, 2008, approved Work Plan stated that 14,000 gallons of 1 – 4% permanganate solution would be injected in both the spring and fall 2009 events. However, in the spring only 7,643 gallons of solution were injected and only 4,170 gallons were injected in the fall. These amounts fall far short of the amount called for in the Work Plan. EPA would like to see the injection events conducted in compliance with the Work Plan.

2) EPA estimates that up to 273,000 gallons of solution will be required to remediate the site (see EPA Region I New England's comment #5 for details). Based on the injection progress to date, it will take several years to reach this quantity. Please outline the efforts you will take to expedite the remediation at this site, together with a schedule identifying when the site cleanup will be completed and when groundwater and soil cleanup standards will be achieved and sustained at the FDDA.

Please find attached two sets of comments prepared by the Agency on the progress reports: EPA Region 1 comments; and EPA ORD's additional comments prepared by Scott Huling, dated January 4, 2010. Please address these comments before the spring 2010 injection activities (April, May, June) but by no later than February 26, 2010.

EPA requests GeoInsight provide EPA, MassDEP, and its technical representatives a presentation on the status of the cleanup with consideration of these comments and recommendations for injections in spring 2010. Please contact me with a date and time when you can visit us our EPA office in February 2010 at either 617.918.1252 (work) or 617.223.1368 (mobile).

Sincerely,

Alex Sherrin
On-Scene Coordinator

Attachments

cc: Joe LeMay, EPA
Scott Huling, EPA ORD
Joe Coyne, MassDEP
Jennifer McWeeney, MassDEP
Dave Sullivan, TRC Solutions
Charles D. Whitten, Olympia Nominee Trust

EPA Region I New England
Comments on GeoInsight's 59, 60 and 61 Progress Reports,
Olympia Source Area Property
Wells G&H Superfund Site

Please find below EPA's comments on GeoInsight's 59, 60, and 61 Progress Report. Please also find attached additional comments provided by EPA ORD dated January 4, 2010. These comments should be addressed prior to the spring 2010 injections (April, May and June).

Since the evaluation of direct push injection during spring and summer 2008 and implementation of the approved October 3, 2008 work plan, the volume and distribution of MnO^{-4} solution has improved at the FDDA, resulting in VOC reductions in some of the monitoring wells. However, as described in the comments below, the volume and distribution of MnO^{-4} solution still needs to be improved to achieve and sustain cleanup levels.

1) Please sample the 600 series monitoring wells (MW-600 through MW-606) for contaminants of concern, and include these wells in periodic monitoring. No groundwater data has been presented for these wells since they were installed.

2) The amount of information on the maps you have submitted is making them diffuciult to interpret. Please provide two separate figures for monitoring wells and injections points. Also, please highlight the newest injection points after each injection at the FDDA.

3) Please monitor water color of all injection and monitoring wells before and after every injection using your current MnO^{-4} color code (0, 1, 2, 3, and 4). Please provide three dimensional, isopleths, or cross-section color code maps (vertical intervals could be abbreviated as shallow, medium and deep within the silt lens (5' - 20')) depicting the color codes (horizontally and vertically) before and after each injection at the FDDA. These color code maps should be provided in each of the progress reports.

As outlined in EPA's May 16, 2008 correspondence, target injections based upon real-time field conditions by checking the color code in every injection and monitoring wells during the October, November, December and April, May and June injection periods, and immediately injecting MnO^{-4} solution at appropriate locations during the same field event. It is suggested that when the color code in an injection point or monitoring well is below 2, then the area near that injection point or monitoring well should be injected immediately to achieve a color code of 3 or 4. The above color code monitoring and mapping (as well as considering the historical contamination (e.g. VOC/TCE groundwater concentrations, VOC/TCE soil concentrations, high PID concentrations, etc.)) will be helpful at determining, documenting, and illustrating the locations warranting further injections/ re-injections.

4) In accordance with the Workplan, EPA expects, at a minimum, 14,000 gallons of MnO^{-4} solution will be injected in the treatment cell (ranging between 2%-4% solution) and, where appropriate, east of the treatment cell (approximately 1% solution) during every spring (April, May and June) and fall (October, November and December) periods until cleanup is achieved and sustained. Please also see the comments below regarding the need for greater volume and distribution of MnO^{-4} solution.

5) As previous discussed with GeoInsight during our December 2007 meeting and subsequent meetings/comments, the volume and distribution of MnO^{-4} is very important for achieving and sustaining groundwater and soil cleanup levels at the FDDA. Please find below an example calculation of the pore volume within the treatment cell:

174,270 cubic feet (cell dimension and approximate vertical treatment zone 157'x74'x15');
conversion factor: 7.481 gallons/cubic feet;
estimated mean effective porosity: 0.12*;
estimated pore volume within cell = **156,446 gallons to fill pore spaces in cell treatment zone**

* published effective porosities range widely as follows:

Fine sand	range 0.01 - 0.46, arithmetic mean 0.33
Silt	range 0.01 - 0.39, arithmetic mean 0.20
Clay	range 0.01 - 0.18, arithmetic mean 0.06

The arithmetic mean between the silt and clay interbedded units (approximately the average of 0.20 for silt and 0.06 for clay) was used to estimate an effective porosity of 0.12. If there is a greater percentage of fine sand within the treatment zone (as suggested by soil boring logs within the treatment cell), then the estimated pore volume would increase (e.g. effective porosity of 0.20 equates to a pore volume of approximately 273,290 gallons).

As of September 2009, the total amount of MnO^{-4} injected/delivered into the treatment cell is approximately **32,130 gallons**. To achieve and sustain groundwater and soil treatment standards within the treatment cell, it appears that additional volumes and distribution of the MnO^{-4} needs to be injected in the treatment cell (with an estimated solution concentration of ranging between 2%-4%). Areas with persistent contamination will warrant additional re-injection and distribution of MnO^{-4} solution. Based upon the gallons delivered versus the estimated pore volume within the cell, it is estimated that at least an **additional 124,316 gallons** of MnO^{-4} solution may need to be delivered/ injected and distributed within the cell. While it is difficult to estimate effective porosity and pore volume, it is best to be conservative and plan to inject more MnO^{-4} gallons than less. Low volume and insufficient distribution of MnO^{-4} solution during the current fall (October, November and December) and spring (April, May, June) injection periods may prolong the schedule to achieve and sustain groundwater and soil treatment standards at the FDDA.

6) During the spring 2009 injection period, additional soil borings (SB700 –SB710) were installed adjacent to various injection points. Some of these soil borings did not display intervals of soil saturated with MnO^{-4} solution when Direct Push (DP) points or injection points were adjacent to the boring such as SB702, while others displayed intermittent intervals of MnO^{-4} solution (but not continuous) such as SB 704 and SB705. Adequate distribution of permanganate solution is very important for achieving and sustaining treatment levels. While there has been a large improvement with the distribution of solution by using direct push methods, these borings demonstrate the need for more solution and distribution in the treatment cell. In addition, GeoInsight maybe able to better track volumes of permanganate injected into specific areas and vertical intervals within the FDDA and correlate these volumes with historical media, contamination concentrations (soils, groundwater, PID, etc), and soil boring photographs. This may help further document and facilitate the locations (horizontally and vertically) warranting further injections re-injections.

7) Persistent contamination remains inside the treatment cells (e.g. MW203D w/ TCE @ 14,000 ppb (the area by MW203 appears to contain significant contamination (where concentrations within the well have rebound) requiring additional injections. For example, comparing the March 31, 2009 and September 30, 2009 reports, it appears rebound was observed at MW-203D, as well as MW-210S, where permanganate was observed in the wells on December 4, 2008 and not observed on April 7, 2009. Historically, rebound has been observed at the following wells: MW-203D (11/05/07 and 3/09/09), MW-210S (4/07/09), MW-206D (8/06/08), and OL-2M (4/24/07). The areas associated with high historical contamination should be monitored closely. The areas where injection or monitoring wells continue to observe high contaminant concentrations, contaminant concentration rebounds, and/or rapid consumption of MnO^{-4} solution (color code changes below 3), may need to be targeted for significant injections/ re-injections.

8) Please find attached a June 7, 2005 GeoInsight figure illustrating injection wells where DNAPL was detected within the treatment cell. Areas of suspected presence of DNAPL have been highlighted in yellow surrounding these injection wells, creating two large yellow highlighted areas. These two yellow highlighted areas may warrant repeated, multiple injections to achieve and sustain groundwater and soil cleanup levels.

9) Persistent contamination remains east of the treatment cell (e.g. MW216S (TCE @ 40,000 ppb) and MW217S (TCE @ 170 ppb). GeoInsight must continue injecting MnO^{-4} 1% solution east of the treatment cell as part of the spring and fall injection periods until groundwater and soil cleanup levels have been achieved and sustained.

10) Persistent contamination remains to the west of the treatment cell at MW-13 (TCE @ 6,300 ppb), MW-213S (TCE @ 6,000 ppb), and MW-014S (TCE @ 27 ppb), where concentrations have increased at MW-13 (since 4/26/06) and MW-213S (since 3/28/07). GeoInsight should develop an injection approach and expand injections to the west of the

treatment cell. EPA suggests the area west of the treatment cell be targeted for injections beginning in the spring 2010 period.

11) Progress report 59 indicates that no permanganate was observed in monitoring wells MW-203S, MW-203D, MW-210S, and MW-211S on April 7, 2009, and these wells (except for MW-203D and MW-211S) as well as other monitoring wells sampled on April 7 or 8, 2009. The progress report states that "concentrations of TCE detected in samples of groundwater are low or non-detect when permanganate is observed in the monitoring wells." It is important to note that permanganate present in a groundwater sample will continue to react with organic contamination in the sample container reducing its concentration. These samples are not representative groundwater samples. Due to this interference, the data may not be an accurate representation or indication of achieving and sustaining groundwater cleanup levels. Also the data should not be used for drawing comparisons with pre-permanganate representative groundwater monitoring well conditions. If permanganate is observed in a sample, the sample must be treated to remove the permanganate immediately in the field. This can be done by adding drops of vinegar/H2O2 solution to the samples prior to closing the sample container.

12) The detection limits for several wells are above the standards. This could be related to the elevated concentrations of 1,1,2-trichlorotrifluroethane. What do you think is the problem and what do you plan to do to lower the detection limits?

13) EPA requests GeoInsight provide EPA, MassDEP and its technical representatives a presentation on the status of the cleanup with consideration of these comments and recommendations for injections in spring 2010. It is suggested that a meeting be scheduled in February 2010.

January 4, 2010

MEMORANDUM

SUBJECT: Wells G&H Superfund Site / Olympia Subsite (10-R01-005)

FROM: Scott G. Huling, Environmental Engineer
Applied Research and Technical Support Branch

TO: Joseph F. Lemay, P.E., Remedial Project Manager
Office of Site Remediation and Restoration

Alex Sherrin, On-Scene Coordinator
Emergency Planning & Response Branch
US EPA Region 1, Boston, MA

A technical review was conducted on the *Fifty-Ninth Progress Report, Administrative Order on Consent for Removal Action, Wells G&H Superfund Site, Olympia Nominee Trust Property, 60 Olympia Avenue, Woburn, Massachusetts, CERCLA Docket #01-2004-0059*, September 30, 2009, prepared by GeoInsight, Inc., for U.S. EPA. The technical review also included the *EPA comments on GeoInsight's 59, 60 and 61 Progress Reports, Olympia Source Area Property, Wells G&H Superfund Site*, prepared by Mr. Joseph LeMay (RPM, Region 1). Dr. Bruce Pivetz of Shaw Environmental and Infrastructure, Inc. assisted in this response. If you have any questions or would like to discuss any of the comments and recommendations, please call at your convenience (580) 436-8610.

cc: Linda Fiedler (5203P)
Steve Mangion, Region 1
Bill Brandon, Region 1
Yoon-Jean Choi, Region 1

Technical Review Comments and Recommendations

General Comments

1. In general, the 59th progress report included most of the information necessary to understand the ISCO activities. Some information was not included, such as the injection pressures. However, references to earlier documents were included for such items.

2. The EPA comments appear appropriate and comprehensive. They make useful recommendations for addressing the significant issues at the site. These include (a) preparation of plan view maps and cross-sections of oxidant and contaminant distribution for both pre- and post-injection (this will aid in planning and reviewing injection locations), and (b) injection of greater volumes of oxidant solution.

3. The volume of oxidant solution injected is less than what was called for in the October 2008 work plan. The work plan indicated that 14,000 gal oxidant solution was to be injected during each of the fall 2008 and spring 2009 injection periods. The fall 2008 injection did deliver almost that oxidant volume; however, the volume injected during spring 2009 (in the treatment cell and outside the treatment cell) was about 2/3 of what the work plan called for. It is recommended that greater volumes of oxidant be injected. The current strategy involves injecting over short intervals separated by intervals without injection. This strategy should be continued during injection of the greater volumes of oxidant solution, as it will help minimize potential lateral displacement of contaminated ground water by the injected oxidant solution.

4. The direct-push injection method changed subsequent to October 2008 from the top-down approach specified in the work plan to the bottom-up approach. In a previous memorandum dated September 11, 2008, it was recommended that the permanganate solution be injected using direct push technology in a top-down approach. It is proposed that this approach minimizes the potential for preferential transport of oxidant solution into preferential pathways resulting from deeper injections. For example, the oxidant injected at the bottom of the injection tip can flow around the tip and be transported downward into the previously injected zones. The top-down approach results in a more competent seal between the injection point and the targeted (designed) vertical interval.

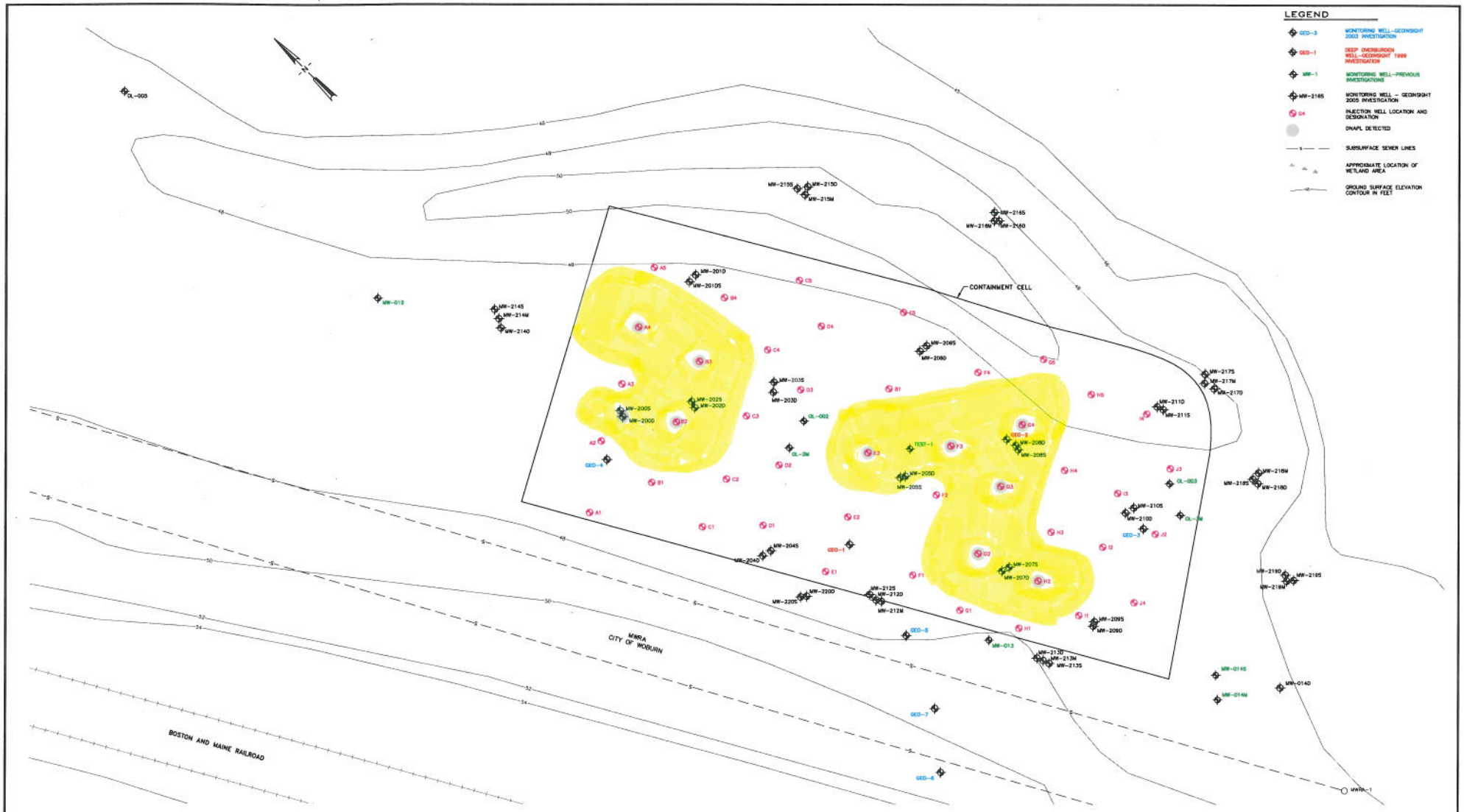
While the progress report does not explicitly indicate the specific direct-push injection approach, Table 5 indicates the chronological sequence in which oxidant was injected into each different depth interval for each direct-push location. The deepest interval at each injection location appears first in the table, indicating that the bottom-up approach was used. Also, Section 5.0 notes that "Direct-push injection methods were described in detail in Section 5 of the March 2009 progress report" (the 55th Progress Report). Reference to the 55th Progress Report indicates that the bottom-up approach was used subsequent to the October 2008 injections.

The bottom-up approach was apparently selected by the injection practitioner as a way to minimize oxidant short-circuiting to the surface (it was thought that the top-down approach

enlarged the borehole too much and allowed short-circuiting). Short-circuiting may be caused by excessive injection pressure. The pressures being used for injection appear higher than those recommended in the work plan and in previous technical review memos and may have led to the short-circuiting problems. The typical direct-push injection pressure cited in the 55th Progress Report is 45 psi. This pressure is higher than the <10 psi pressures recommended in the July 17, 2008 technical review memorandum from Scott Huling to Joe LeMay, and higher than those specified in the October 2008 work plan. The higher pressures currently used may have contributed to the occurrence of short-circuiting, and the decision to switch to a bottom-up injection method rather than the top-down method. It is not clear if lower pressures have already been attempted; and, if so, what effect they had on the oxidant delivery.

It is recommended that the injection pressures be decreased, and the top-down approach used once again (at the lower pressures) to see if that combination can effectively inject oxidant without short-circuiting. The top-down approach will help prevent oxidant injected at the shallower depths from moving down the borehole. This may also allow resumption of injections at the shallowest interval (9 to 10 ft bgs), which were halted subsequent to October 2008 due to short-circuiting.

5. Previously it was recommended that the injection locations be backfilled with a cement/bentonite slurry (Type I Portland cement and 4% (by weight) bentonite powder (200 mesh)) immediately after oxidant injection. This involves a disposable injection point and a bottom-up grout injection procedure. A grout pump is used to inject grout in the Geoprobe rod as it is being removed. This will help to minimize potential preferential pathways that may interfere with the effective delivery of oxidant in nearby injection locations, and in future injections. It is unclear whether this is currently being performed. Please clarify this issue.



NOTES:

1. BASE PLAN DEVELOPED FROM TRC OF LOWELL, MASSACHUSETTS' DRAWING TITLED "MAXIMUM PID SOIL CONTAMINATION CONTOURS".

GEO Insight INC	CLIENT: OLYMPIA NOMINEE TRUST			
	PROJECT: 60 OLYMPIA STREET			
TITLE: SITE PLAN				
DESIGNED: JS	DRAWN: NMT	CHECKED: MJW	APPROVED: MJW	FIGURE NO.: 1
SCALE: 1" = 10'	DATE: 6/7/05	FILE NO.: 24910071	PROJECT NO.: 2491-000	